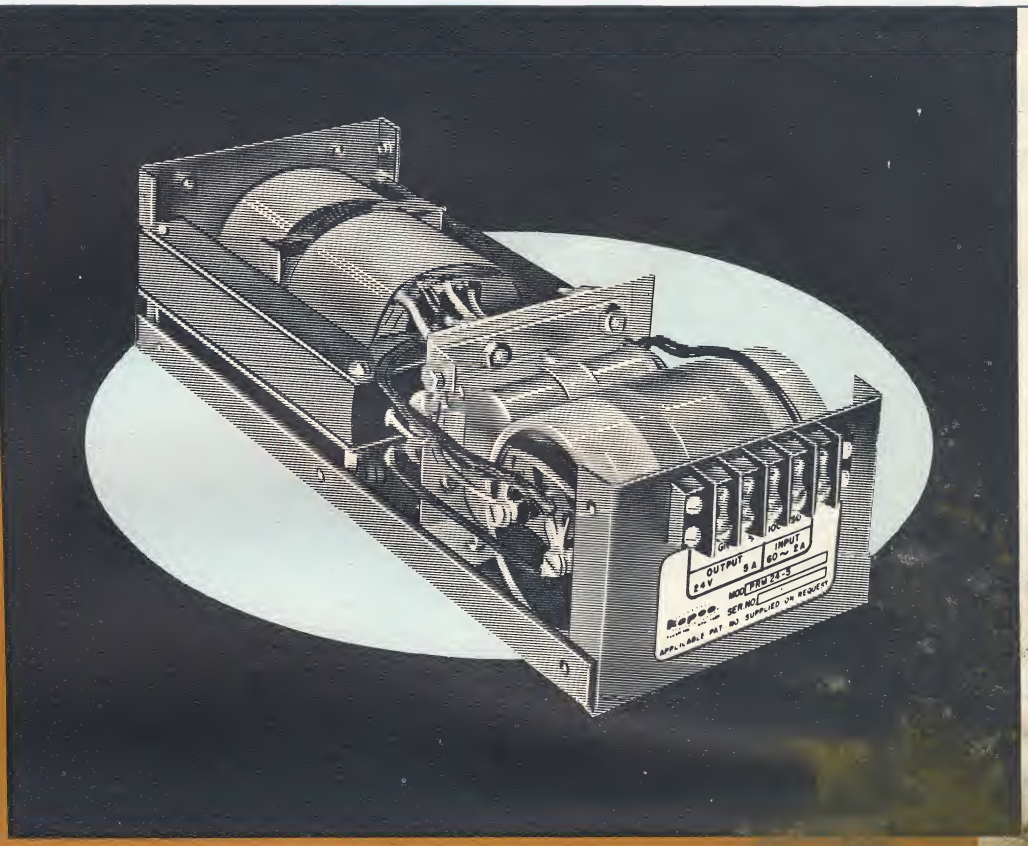
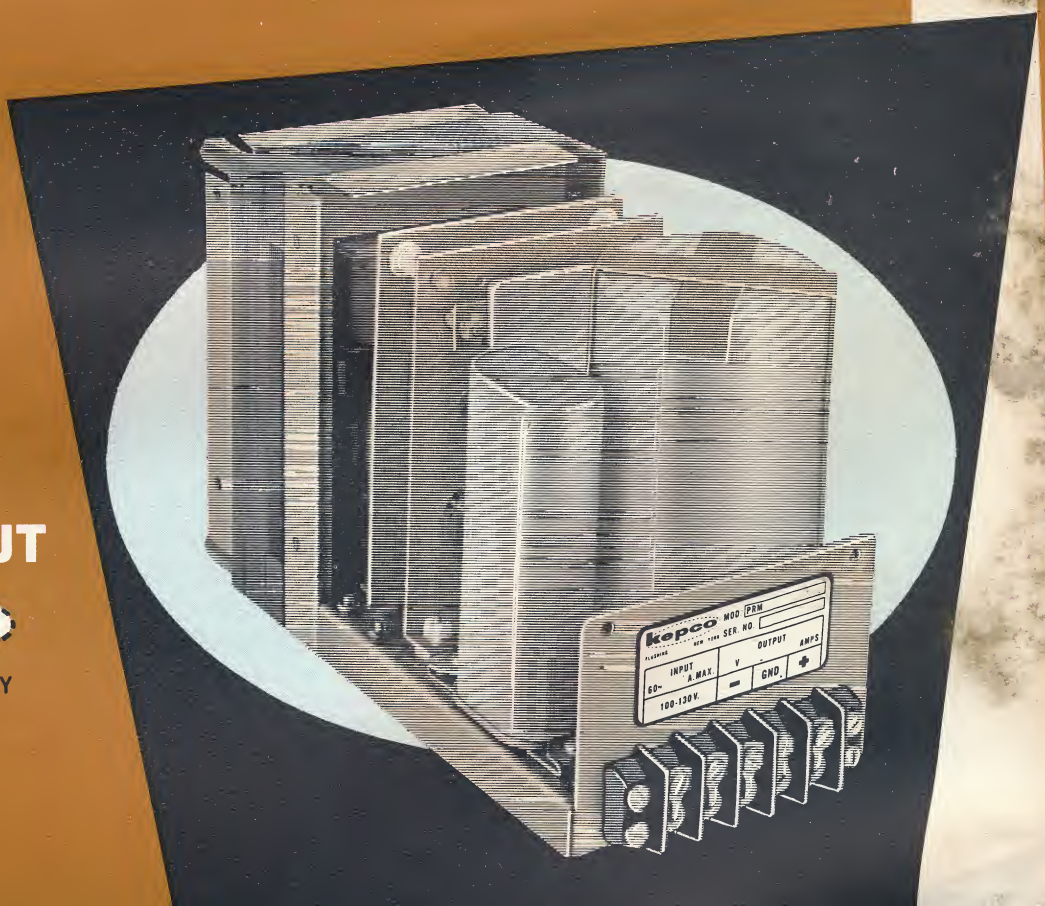
#146-1109



KEPCO
POWER MODULES



FIXED OUTPUT

PRM

REGULATED DC SUPPLY

GROUP

kepco

PRM

REGULATED DC SUPPLY

SOLID STATE

MODULAR GROUP

- *more DC output watts per dollar, per pound, per cubic inch*
- *highly reliable, maintenance-free operation assured by good design and basic simplicity*
- *fixed DC output voltages*

±1% LINE REGULATION

MODEL	DC OUPUT VOLTS	DC OUPUT AMPS	LOAD REGULATION* ΔV INCREASE 100% to 50% LOAD	LOAD REGULATION* ΔV INCREASE 100% to 25% LOAD	RIPPLE (MAX) RMS VOLTS	SIZE	SERIES
PRM 6–15	6.3	0–15	0.5	0.7	0.4	B	120
PRM 6–25	6.3	0–25	0.4	0.6	0.4	A	180
PRM 12–10	12	0–10	0.6	1.0	0.4	B	120
PRM 12–15	12	0–15	0.4	0.8	0.4	A	180
PRM 18–6.7	18	0–6.7	0.8	1.3	0.3	B	120
PRM 18–10	18	0–10	0.5	0.9	0.3	A	180
PRM 24–5	24	0–5	1.0	1.7	0.3	B	120
PRM 24–8	24	0–8	0.5	0.9	0.3	A	180
PRM 28–4.3	28	0–4.3	1.2	2.0	0.3	B	120
PRM 28–7	28	0–7	0.5	0.9	0.4	A	180
PRM 36–3.3	36	0–3.3	1.5	2.4	0.3	B	120
PRM 36–5	36	0–5	0.8	1.3	0.4	A	180
PRM 48–2.5	48	0–2.5	1.8	3.1	0.3	B	120
PRM 48–4	48	0–4	1.0	1.8	0.3	A	180
PRM 60–2	60	0–2	2.3	3.8	0.3	B	120
PRM 60–3	60	0–3	1.0	1.8	0.3	A	180
PRM 120–1	120	0–1	4.3	7.3	0.3	B	120
PRM 120–1.5	120	0–1.5	2.2	3.6	0.3	A	180

FIGURE 1

* Measured at 115V AC Line

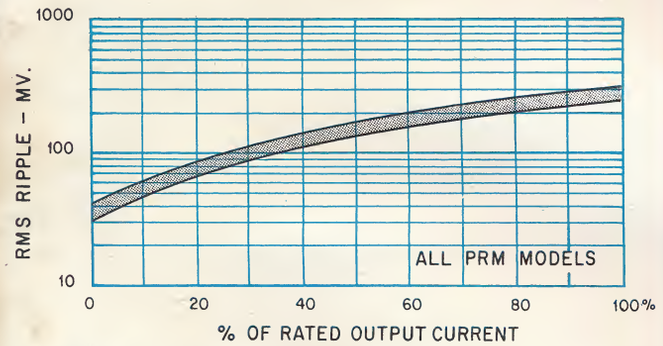
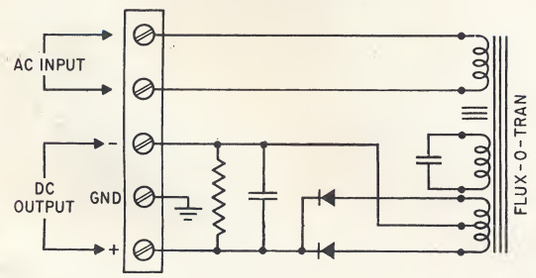


FIGURE 2 TYPICAL RIPPLE FOR PRM UNITS AS A FUNCTION OF LOAD



SPECIFICATIONS, General

REGULATION: LINE: Less than ±1% output voltage change for 115±15V AC line variation at loads greater than 25% of rating. Below 25% load, the output voltage change is less than ±1.5%.

LOAD: See Figure 1 for maximum specification. See Figure 3 for typical load regulation curves.

ACCURACY: ±2% of specified output voltage at nominal line, full load and 30°C ambient temperature.

STABILITY: Output varies less than 1% or 0.1V whichever is greater over a period of 8 hours after warmup. Measured at constant line voltage, load and ambient temperature.

TEMPERATURE COEFFICIENT: Output voltage changes less than 0.05% per °C.

RIPPLE: For maximum ripple at maximum rated output voltage and current, see Figure 1. For typical ripple values at reduced output currents see Figure 2.

AMBIENT OPERATING TEMPERATURE: —20°C to +55°C maximum.

STORAGE TEMPERATURE: —40°C to +85°C maximum.

OUTPUT IMPEDANCE: Same for all models: 1 kc to 10 kc less than 0.05 ohms; 10 kc to 100 kc less than 0.05 ohms plus 0.5 uh effective series inductance. Below 1000 cps, impedance is a function of load current and is determined by reference to the load regulation curve. Impedance is the slope of the curve $\Delta E/\Delta I$.

INPUT REQUIREMENTS: 115V±15V AC, 60 cps ±5%. Input current is approximately 3 amperes (280 watts) for the "A" style PRM supplies, approximately 2 amperes (190 watts) for the "B" style units. External fusing is required.

For models to operate at 104 ± 11.5V AC; 115 ± 15V AC; 208 ± 23V AC or 230 ± 30V AC, 50 cps ± 5%, add suffix "–50" to model number and derate output *current* by 20%.

Note: % changes in line frequency produce approximately equal % changes in output voltage linearly within stated input frequency tolerances.

SPECIFICATIONS, Performance

CONSTANT VOLTAGE TRANSFORMER: Flux-O-Tran power transformer delivers regulated square wave voltage to rectifiers, improving rectifier and capacitor utilization and reducing output ripple.

OVERLOAD PROTECTION: Special Flux-O-Tran power transformer allows output to be shorted without adverse effect.

SILICON RECTIFIERS: Reliable, efficient, full wave rectification.

CAPACITIVE FILTER: Capacitive filtering provides excellent ripple reduction and minimizes transients.

CONVECTION COOLING: Heat removal is by natural convection.

ISOLATION VOLTAGE: A maximum of 600 volts can be connected between the chassis and either output terminal.

PARALLEL OPERATION: Supplies of the same model numbers can be paralleled for increased current.

SERIES OPERATION: Supplies can be series connected for increased voltage.

© KEPCO, Inc. 1965

SPECIFICATIONS, Physical

TERMINALS AND CONTROLS: *On Rear of Chassis:* Barrier strip terminals provide for AC input, DC output and ground connections. Output terminals are isolated from ground and either positive or negative output may be grounded.

DIMENSIONS:

Size A: *Uncased:* 6¾" H x 4¾" W x 10⅜" D
Cased: 6 15/16" H x 5" W x 10 7/16" D
Size B: *Cased only:* 3 13/32" H x 5" W x 13 13/16" D

STANDARD FINISH: CASES: Blue finished aluminum, (special finishes to order). "A" units chassis: cadmium plated, cronak wash.

ACCESSORIES: "A" units available with or without case, to specify cased unit, add suffix "C" to the model number eg: PRM 24-8C. Case includes wraparound, end plate and 4 removable feet for bench use.

RACK ADAPTERS: For 180 Series:

RA 8-2 (5¼" H x 19" W) for (2) A size PRM modules.
RA 9-3 (7" H x 19" W) for (3) A size PRM modules.
RA 10-1 (5¼" H x 19" W) for (1) A size PRM module.
RA 18-1 (5¼" H x 19" W) for (1) Extra Filtered module.

For 120 Series:

RA 14-3 (3½" H x 19" W) for (3) B size PRM modules.
RA 15-1 (3½" H x 19" W) for (1) B size PRM module.
RA 16-4 (5¼" H x 19" W) for (4) B size PRM modules.
RA 17-5 (5¼" H x 19" W) for (5) B size PRM modules.

Finish: Frosty etch, clear epoxy coating. (special finishes to order).

CUSTOM OPTIONS: Special models available with custom ratings. Contact your nearest Kepco sales engineer with your special requirements.

Extra Filtered Models: Units in the 180 series (Size A only) can be ordered with extra filtering by appending the suffix "F" to the model number. The added filter is an extra LC section which reduces ripple more than 10:1. The added choke introduces a 2% drop in the nominal voltage rating at full load. Alternatively, at the user's option, the nominal voltage is restored by a 10% reduction in output current. Size is increased to 14⅜" in the longest dimension (uncased), 14 7/16" cased. The end dimensions remain 6¾" H x 4¾" W, uncased, 6 15/16" H x 5" W, cased.

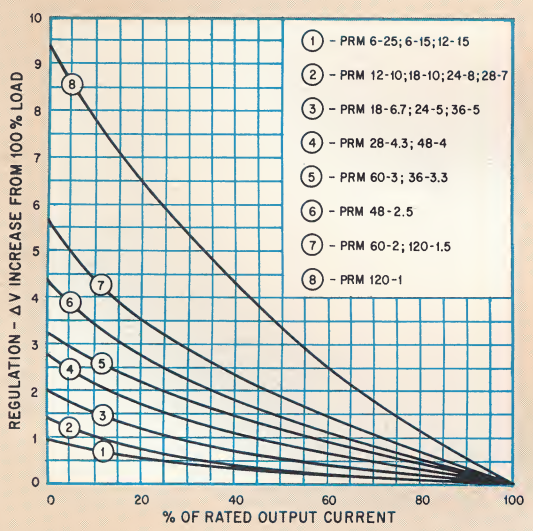


FIGURE 3 TYPICAL LOAD REGULATION FOR PRM UNITS

All models are designed for continuous operation without derating under all specified line, load and temperature conditions.

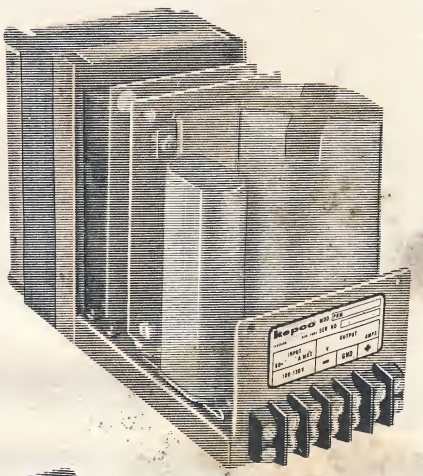
SOLID STATE

kepco

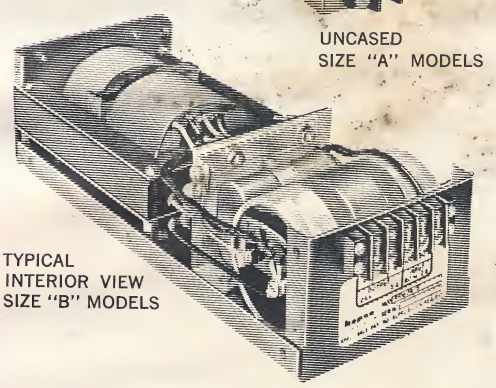
PRM

REGULATED DC SUPPLY

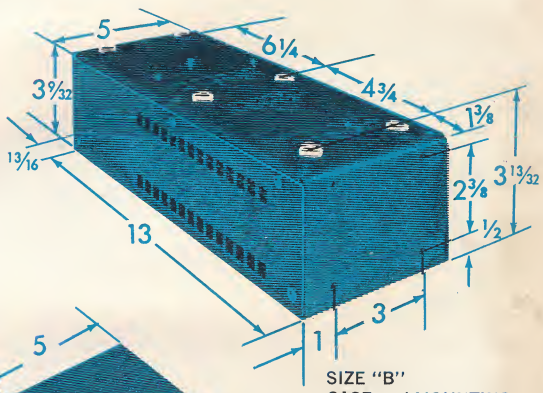
MODULAR GROUP



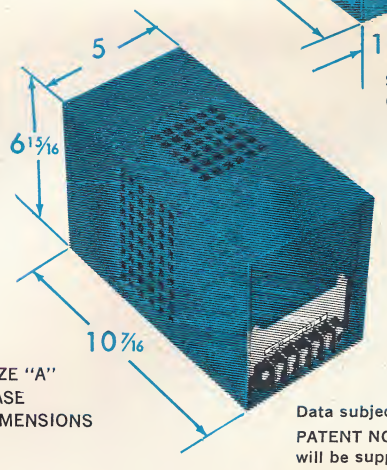
UNCASED
SIZE "A" MODELS



TYPICAL
INTERIOR VIEW
SIZE "B" MODELS



SIZE "B"
CASE and MOUNTING
DIMENSIONS



SIZE "A"
CASE
DIMENSIONS

Data subject to change without notice

PATENT NOTICE: Applicable Patent Nos. will be supplied on request.

kepco®

SALES REPRESENTATIVES

General Offices and Plant: KEPCO, INC. • 131-38 SANFORD AVENUE • FLUSHING, N.Y. 11352
Phone: (212) 461-7000 • TWX #212-539-6623 • Cable: KEPCOPOWER NEWYORK

1. **N. Y. METROPOLITAN AREA and Northern New Jersey**
EASTERN INSTRUMENTATION, INC.
350 Northern Blvd., Great Neck, N.Y. 11021
N.Y. Phone: (516) 466-9505
N.J. Phone: (201) 779-1234

2. **TRUMBULL, CONNECTICUT**
RAY PERRON & COMPANY, INC.
36 Louis Street, Trumbull, Conn. 06611
(203) AM 8-9631

FARMINGTON, CONNECTICUT
RAY PERRON & COMPANY, INC.
10 Briarwood Road, Farmington, Conn. 06032
(203) OR 7-9025

3. **BOSTON, MASSACHUSETTS**
RAY PERRON & COMPANY, INC.
1870 Centre Street, Boston, Mass. 02132
(617) FA 3-1008 — TWX #617-325-8627

4. **MANCHESTER, NEW HAMPSHIRE**
RAY PERRON & COMPANY, INC.
19 Caron Road - Bedford RFD #2
Manchester, N.H. 03102
(603) 472-4091 — TWX #603-472-3960

5. **UTICA, NEW YORK**
NACO ELECTRONICS CORP.
2631 Edgewood Road, Utica, N.Y. 13501
(315) RE 2-1801

6. **SYRACUSE, NEW YORK**
NACO ELECTRONICS CORP.
119 Luther Avenue, Liverpool, N.Y. 13088
(315) GR 4-7481 — TWX #710-541-0439

7. **BINGHAMTON, NEW YORK**
NACO ELECTRONICS CORP.
4677 Vestal Pkway., East,
Binghamton, N.Y. 13903 (607) 729-6641

8. **ROCHESTER, NEW YORK**
NACO ELECTRONICS CORP.
74 Park Avenue, Rochester, N.Y. 14450
(716) GR 3-4169

9. **PHILADELPHIA, PENNA.**
EASTERN INSTRUMENTATION INC.
613 Cheltenham Avenue, Philadelphia, Pa. 19126
(215) WA 7-6269

10. **WASHINGTON, D. C.**
LEE ASSOCIATES, INC.
12250 Wilkins Avenue, Rockville, Md. 20852
(301) 949-4800 — TWX #710-828-9688

11. **WINSTON SALEM, N. C.**
LEE ASSOCIATES, INC.
P.O. Box 906, Winston Salem, N.C. 27101
(919) 724-2406

12. **ORLANDO, FLORIDA**
LEE ASSOCIATES, INC.
P.O. Box 7896, Orlando, Fla. 32804
(305) 241-4445 — TWX #305-275-1732

13. **HUNTSVILLE, ALABAMA**
LEE ASSOCIATES, INC.
P.O. Box 1506, Huntsville, Ala. 35807
(205) 881-0461—TWX #205-533-2066

14. **CINCINNATI, OHIO**
THE SATULLO COMPANY
618 Cincinnati-Batavia Pike, Cincinnati, Ohio 45244
(513) 752-6683

15. **CLEVELAND, OHIO**
THE SATULLO COMPANY
16801 Euclid Avenue, Cleveland, Ohio 44112
(216) IV 6-2800

16. **DETROIT, MICHIGAN**
THE SATULLO COMPANY
4514 N. Woodward Ave., Royal Oak, Mich. 48072
(313) LI 9-3910

17. **CHICAGO, ILLINOIS**
MIDWEST ELECTRONIC SALES
5707 W. Division St., Chicago, Ill. 60651
(312) 626-0030 — TWX #312 265-1415

INDIANAPOLIS, INDIANA
MIDWEST ELECTRONIC SALES
5462 E. 40th St., Indianapolis, Ind. 46226
(317) LI 7-3259

MILWAUKEE, WISCONSIN
MIDWEST ELECTRONIC SALES
1317 Garfield Ave., Waukesha, Wisc. 53186
(414) 542-5129

18. **ST. LOUIS, MISSOURI**
NORMAN W. KATHRINUS & COMPANY
2427 Brentwood Blvd., St. Louis, Mo. 63144
(314) WO 2-5627

19. **MINNEAPOLIS, MINNESOTA**
E. C. ELECTRONIC SALES
10108 Abbot Ave., So., Minneapolis, Minn. 55431
(612) 869-1144 — TWX #612-292-4195

20. **KANSAS CITY, KANSAS**
NORMAN W. KATHRINUS & COMPANY
P.O. Box 23, Kansas City, Kan. 66103
(913) AD 6-4108

21. **DALLAS, TEXAS**
AIREP ENGINEERING COMPANY
P.O. Box 9555, Dallas, Texas 75214
(214) TA 4-3800

22. **HOUSTON, TEXAS**
AIREP ENGINEERING COMPANY
P.O. Box 36211, Houston, Texas 77036
(713) GY 4-2260

23. **ALBUQUERQUE, NEW MEXICO**
V. T. RUPP COMPANY
9611 Acoma Rd., S.E. Albuquerque, N.M. 87112
(505) 298-5589 — TWX #505-243-8409

24. **DENVER, COLORADO**
D. E. BOND ASSOCIATES
5670 East Evans, Denver, Colo. 80222
(303) 756-1234

25. **SAN DIEGO, CALIFORNIA**
V. T. RUPP COMPANY
3445 Fifth Avenue, San Diego, Cal. 92103
(714) CY 8-9835 — TWX #714-291-0736
In Arizona: Call Phoenix Enterprise 1234

26. **LOS ANGELES, CALIFORNIA**
V. T. RUPP COMPANY
307 Parkman Avenue, Los Angeles, Cal. 90026
(213) DU 7-8224 — TWX #213-380-8840

27. **SAN FRANCISCO, CALIFORNIA**
V. T. RUPP COMPANY
1182 Los Altos Avenue, Los Altos, Cal. 94022
(415) 948-1483 — TWX #415-949-7950

28. **SEATTLE, WASHINGTON**
HARRY LEVINSON COMPANY
1211 East Denny Way, Seattle, Wash. 98122
(206) EA 3-5100 — TWX #206-998-1047

IN CANADA

29. **TORONTO, CANADA**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
50 Wingold Avenue, Toronto 19, Canada
(416) RU 1-6174 — Telex 02-2319

30. **MONTREAL, QUEBEC**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
3333 Cavendish Blvd., Montreal, Quebec
(514) HU 9-8495 — Telex 01-2141

31. **OTTAWA, ONTARIO**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
342½ Elgin Street, Ottawa, Ontario
(613) CE 3-9471

32. **VANCOUVER, B.C.**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
909 Beach Avenue, Vancouver, B.C.
(604) MU 4-7927

OVERSEAS OFFICES

GREAT BRITAIN
AD. AURIEMA, LTD.
Impectron House, 125 Gunnersbury Lane
Acton, London W.3, England
Tel. ACorn 8762, Cable: AIREMA LONDON,
Telex: 25864

BELGIUM, LUXEMBOURG, and the NETHERLANDS
AD AURIEMA — EUROPE S.A.
172a Rue Brogniez, Brussels 7, Belgium
Tel: 22-28-35, Cable: ADAURI BRUSSELS,
Telex: 21646

FRANCE
AD. AURIEMA — FRANCE, S.A.R.L.
243 bis, Boulevard Pereire, Paris 17, France
Tel: ETOile 12-49 or 15-51, Cable: ADAURIE

AUSTRIA AND SWITZERLAND
AD. AURIEMA — EUROPE, S.A.
Fleiner Strasse 17
7100 Heilbronn (Neckar), West Germany
Tel: (07131) 8-23-24, Telex: 728639

ITALY
AD. AURIEMA, INC.
Via Ferdinando di Savoia 2
Milan, Italy
Tel: 653, 106 Cable: FERCO MILAN

GERMANY
DIPL.-ING. ERNST FEY
8 Munchen 2, Hormansstrasse 28 Germany
Tel: 60459, 69566,
Cable: FEYELECTRONIC-MUNCHEN

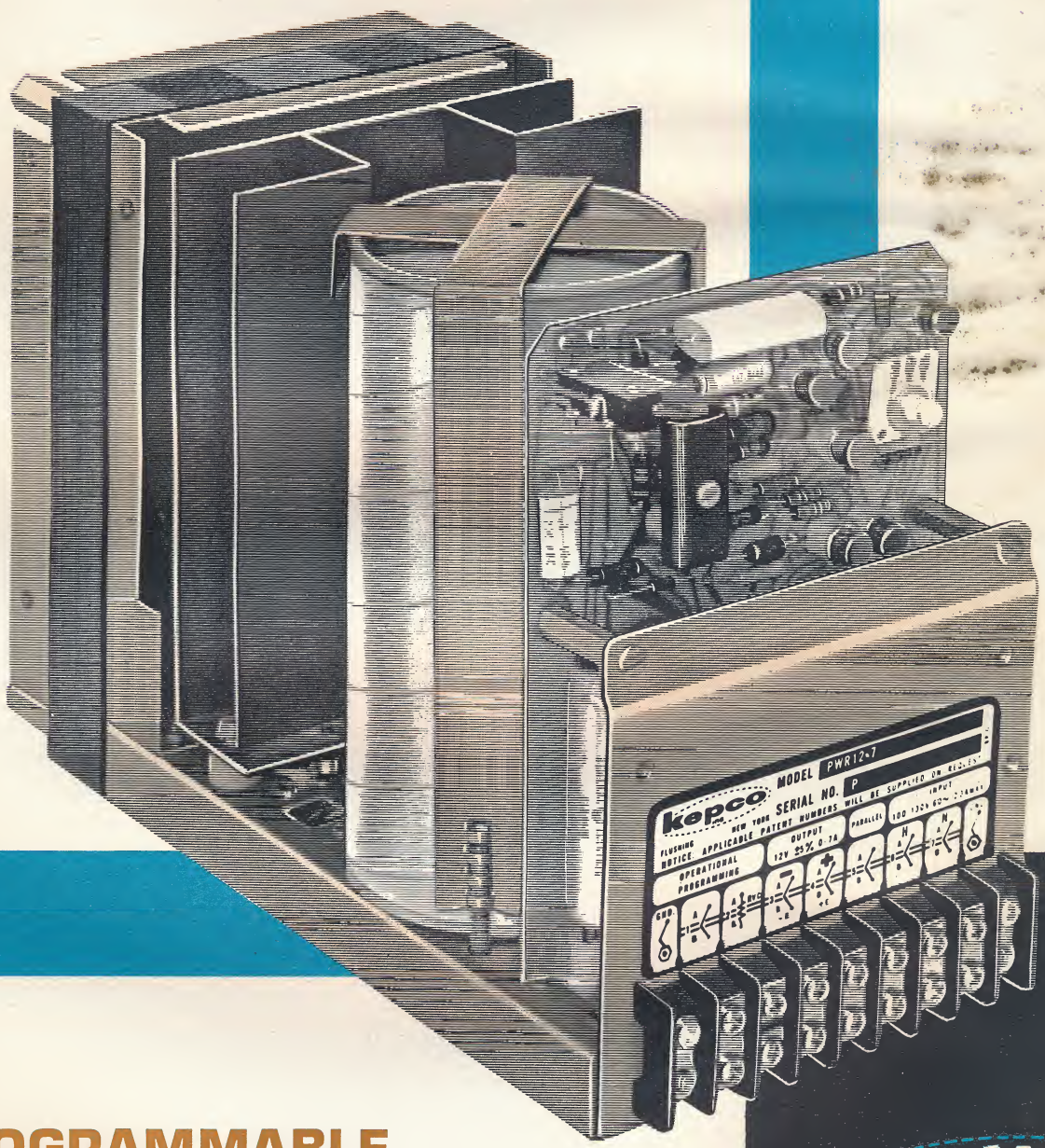
FOR OTHER FOREIGN COUNTRIES — CONTACT:

AD. AURIEMA, INC.
85 Broad Street, New York, N.Y. 10004
Tel: (212) BO 9-7750, Cable: AURIEMA, NEWYORK
Telex: RCA N.Y. 2791, TWX #710-581-3864

LITHO IN U.S.A.

#146-1108

KEPCO POWER MODULES



PROGRAMMABLE
PRECISION REGULATED

PWR
REGULATED DC SUPPLY
GROUP

kepco

PWR

REGULATED DC SUPPLY

TRANSISTORIZED

MODULAR GROUP

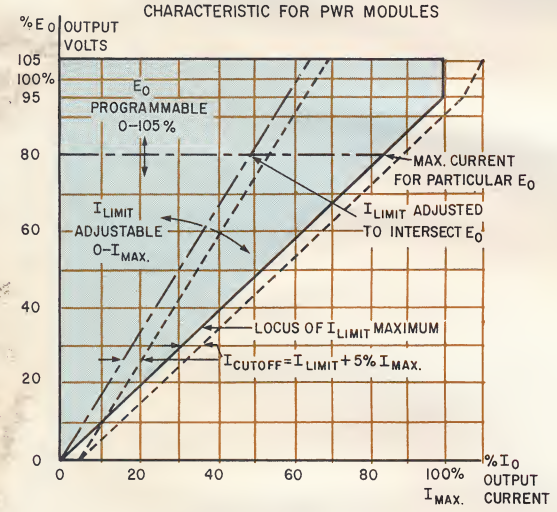
- *all silicon design*
- *modular packaging*
- *unique current cut-off protects load*
- *precision regulation*
- *full range programming*

REGULATION

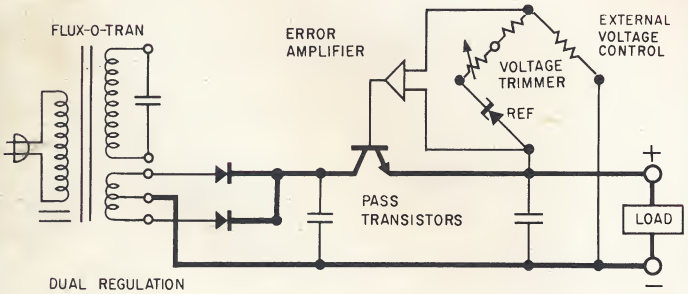
0.005% LINE — 0.05% LOAD

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS	OUTPUT IMPEDANCE OHMS MAX DC to 100 cps	100 cps to 1 kc	1 kc to 100 kc+μh
PWR 12–7	0–12	0–7	0.001	0.005	0.1 + 0.5μh
PWR 15–6	0–15	0–6	0.002	0.005	0.1 + 0.5μh
PWR 24–4	0–24	0–4	0.003	0.005	0.05 + 0.5μh
PWR 28–3.3	0–28	0–3.3	0.004	0.005	0.05 + 0.5μh
PWR 48–2	0–48	0–2	0.015	0.005	0.05 + 0.5μh
PWR 60–1.5	0–60	0–1.5	0.02	0.005	0.05 + 0.5μh

OPERATING REGION AND OVERLOAD CHARACTERISTIC FOR PWR MODULES



I_{LIMIT} IS THE MAXIMUM OPERATING CURRENT FOR ANY SELECTED CUTOFF CURRENT. I_{LIMIT} IS APPROXIMATELY EQUAL TO I_{CUTOFF} MINUS 5% $I_{MAX.}$



All models are designed for continuous operation without derating under all specified line, load and temperature conditions.

SPECIFICATIONS, Voltage Regulation Mode

REGULATION: *Line:* Less than 0.005% output voltage change for 100-130V AC variation.
Load: Less than 0.05% or 1 mv output voltage change, whichever is greater, for output current changes from *no load* to the *current limit* locus.

STABILITY: Output voltage varies less than 0.05% or 3 millivolts, whichever is greater, over a period of 8 hours after warmup. Measured at constant line voltage, load and ambient temperature. (See "Controls").

TEMPERATURE COEFFICIENT: Output voltage changes less than 0.05% per °C. (See "Controls").

RIPPLE: Less than 0.25 mv rms.

RECOVERY TIME: 50 microseconds.

OUTPUT IMPEDANCE: Specified for each model within the load frequency range shown in the table. Above 10 kc include the reactive impedance of the effective series inductance as indicated.

SPECIFICATIONS, Current Regulation Mode

External Sensing

OUTPUT RANGE: Current regulation from 1 ma to 100% of the maximum rated current.

COMPLIANCE: Voltage compliance is from the intercept of the I_{LIMIT} locus to 105% of the rated maximum output voltage. For any selected current value, the compliance is the portion of the current line lying within the shaded portion of the operating region plot. The output voltage automatically varies throughout this region as required to regulate current through a variable load. For loads which require compliance outside of the operating region (below the limit locus), the current cut-off characteristic controls the output.

REGULATION: *Line:* For 100-130V AC line variations, output current changes less than 0.05% when the specified voltage sample is maintained across the external sensing resistor.
Load: For the maximum change in load resistance, within the rated compliance range, output current changes less than 0.1% when the specified voltage sample is maintained across the external sensing resistor.
The sensing resistor is chosen to produce a 1 volt drop at the maximum operating current. A separate control is used externally to provide high resolution current adjustability.

STABILITY: Output current varies less than 0.1% or 1 ma, whichever is greater, over a period of 8 hours after warmup. Measured at constant line voltage, load and ambient temperature.

TEMPERATURE COEFFICIENT: Output current changes less than 0.1% per °C.

RIPPLE: Less than 0.1% of maximum current, rms.

INPUT REQUIREMENTS: 100-130V AC, 60 cps ±1 cps single phase. Input current approximately 2 amperes, 200 watts. For models to operate at 104 ±11.5V AC; 115 ±15V AC; 208 ±23V AC or 230 ±30V AC, 50 cps ±1 cps, add suffix "−50" to model number and derate output *current* by 20%.

AMBIENT OPERATING TEMPERATURE:
Uncased: −20°C to +65°C maximum
Cased: −20°C to +55°C maximum

STORAGE TEMPERATURE: −40°C to +85°C

ISOLATION VOLTAGE: A maximum of 500 volts can be connected between the chassis and either output terminal.

SPECIFICATIONS, Performance

CONTROLS: PWR Modules are supplied with a built-in ±5% trimmer adjustment which operates for voltage or current

© KEPCO, Inc. 1965

control. The main output control is exercised by means of external resistances which may be fixed, stepped or variable. A fixed 1% resistor, selected to program the rated output voltage is supplied with each module. Stability and temperature coefficient criteria require the use of high quality LTC, 20PPM wire-wound elements for programming.

PROGRAMMING: Terminals provide for resistive programming of voltage or current at approximately 1000 ohms per volt. Programming terminals are also provided for programming by means of remotely located voltage or current signals. Output current derates linearly with voltage (see operating region characteristic). The current cutoff setting automatically tracks the voltage to provide proportionally constant overload protection.

OVERLOAD PROTECTION: The cutoff current limit is adjustable from approximately 5% to 105% of the rated output current. When overloaded, output current reduces along the cutoff line to approximately 5% of the rated maximum into a short circuit. Cutoff should be set to exceed the maximum expected *operating* current (I_{LIMIT}) by an amount equal to 5% of the *maximum* current rating of the power supply.

The negative resistance character of the cutoff locus may cause severely non-linear loads (requiring large starting surge currents) to "lock out" for certain settings of the cutoff current limit. For such loads, a series starting resistance can be used to limit the starting surge so that operation can be contained within the shaded region of the graph. Some examples of non-linear loads are: high intensity filament lamps and motors.

REMOTE ERROR SENSING: Error sensing terminals enable specified voltage regulation to be maintained directly at the load by compensating for voltage drops up to 0.5 volts across each load supply lead.

SERIES/PARALLEL OPERATION: Connections provided for series/parallel operation of identical units using master/slave configurations.

CONVECTION COOLING: Heat removal is by natural convection.

OVERSHOOT: No output voltage overshoot from turn-on, turn-off or power failure for output settings above 25% of maximum rated voltage. Below 25%, output overshoot is a function of load and is negligible for loads in excess of 10%.

SPECIFICATIONS, Physical

TERMINALS AND CONTROLS: *On Rear of Chassis:* Barrier strip terminals provide for AC input, DC output, remote error sensing, programming and ground terminals. Output terminals are isolated from ground, either positive or negative output may be grounded.

DIMENSIONS: *Uncased:* 6¾" H x 4¾" W x 10⅜" D
Cased: 6 15/16" H x 5" W x 10 7/16" D

STANDARD FINISH: *Chassis:* cadmium plated, cronak wash. *Case:* blue finished aluminum (special finishes to order).

ACCESSORIES: *Cased Units:* To specify cased unit, add suffix "C" to the model no. eg: PWR 15-6C for module with case. Case includes wrap-around, end plate and 4 removable feet for bench use.

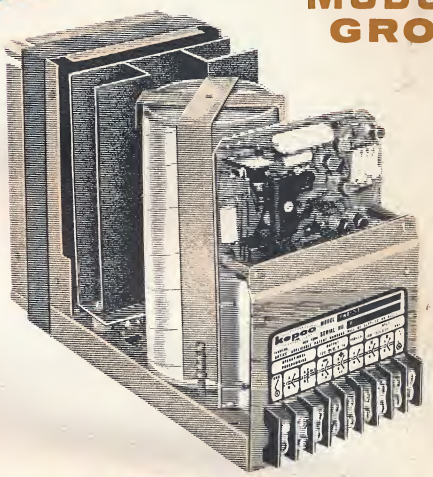
RACK ADAPTERS:
RA 8-2: (5¼" H x 19" W) accommodates 2 PWR modules.
RA 9-3: (7" H x 19" W) accommodates 3 PWR modules.
RA 10-1: (5¼" H x 19" W) accommodates 1 PWR module.
Finish: Frosty etch, clear epoxy coating. (special finishes to order).

CUSTOM OPTIONS: Special models available with custom ratings. Contact your nearest Kepco sales engineer with your special requirements.

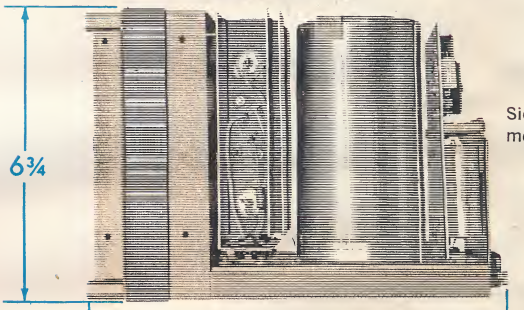
TRANSISTORIZED

kepco PWR REGULATED DC SUPPLY

MODULAR GROUP

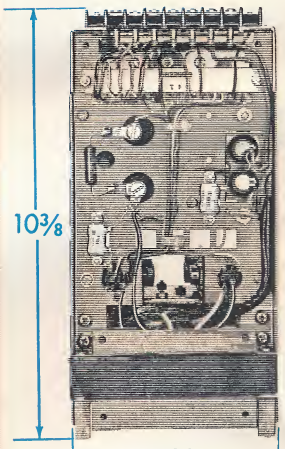


Uncased unit
Model PWR 12–7

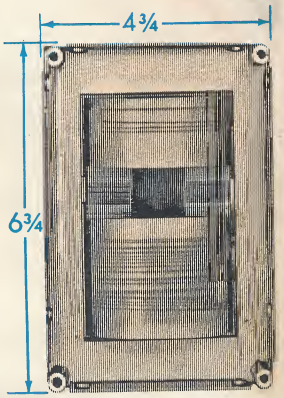


Side mounting

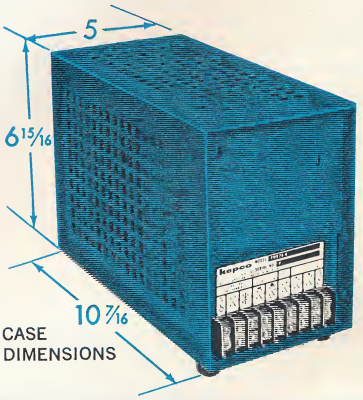
DIMENSIONS WITHOUT CASE



Bottom mounting



End mounting



CASE DIMENSIONS

Data subject to change without notice

PATENT NOTICE: Applicable Patent Nos. will be supplied on request.

kepco®

SALES REPRESENTATIVES

General Offices and Plant: KEPCO, INC. • 131-38 SANFORD AVENUE • FLUSHING, N.Y. 11352
Phone: (212) 461-7000 • TWX #212-539-6623 • Cable: KEPCOPOWER NEWYORK

1. **N. Y. METROPOLITAN AREA and Northern New Jersey**
EASTERN INSTRUMENTATION, INC.
350 Northern Blvd., Great Neck, N.Y. 11021
N.Y. Phone: (516) 466-9505
N.J. Phone: (201) 779-1234

2. **TRUMBULL, CONNECTICUT**
RAY PERRON & COMPANY, INC.
36 Louis Street, Trumbull, Conn. 06611
(203) AM 8-9631

FARMINGTON, CONNECTICUT
RAY PERRON & COMPANY, INC.
10 Briarwood Road, Farmington, Conn. 06032
(203) OR 7-9025

3. **BOSTON, MASSACHUSETTS**
RAY PERRON & COMPANY, INC.
1870 Centre Street, Boston, Mass. 02132
(617) FA 3-1008 — TWX #617-325-8627

4. **MANCHESTER, NEW HAMPSHIRE**
RAY PERRON & COMPANY, INC.
19 Caron Road - Bedford RFD #2
Manchester, N.H. 03102
(603) 472-4091 — TWX #603-472-3960

5. **UTICA, NEW YORK**
NACO ELECTRONICS CORP.
2631 Edgewood Road, Utica, N.Y. 13501
(315) RE 2-1801

6. **SYRACUSE, NEW YORK**
NACO ELECTRONICS CORP.
119 Luther Avenue, Liverpool, N.Y. 13088
(315) GR 4-7481 — TWX #710-541-0439

7. **BINGHAMTON, NEW YORK**
NACO ELECTRONICS CORP.
4677 Vestal Pkway., East,
Binghamton, N.Y. 13903 (607) 729-6641

8. **ROCHESTER, NEW YORK**
NACO ELECTRONICS CORP.
74 Park Avenue, Rochester, N.Y. 14450
(716) GR 3-4169

9. **PHILADELPHIA, PENNA.**
EASTERN INSTRUMENTATION INC.
613 Cheltenham Avenue, Philadelphia, Pa. 19126
(215) WA 7-6269

10. **WASHINGTON, D. C.**
LEE ASSOCIATES, INC.
12250 Wilkins Avenue, Rockville, Md. 20852
(301) 949-4800 — TWX #710-828-9688

11. **WINSTON SALEM, N. C.**
LEE ASSOCIATES, INC.
P.O. Box 906, Winston Salem, N.C. 27101
(919) 724-2406

12. **ORLANDO, FLORIDA**
LEE ASSOCIATES, INC.
P.O. Box 7896, Orlando, Fla. 32804
(305) 241-4445 — TWX #305-275-1732

13. **HUNTSVILLE, ALABAMA**
LEE ASSOCIATES, INC.
P.O. Box 1506, Huntsville, Ala. 35807
(205) 881-0461—TWX #205-533-2066

14. **CINCINNATI, OHIO**
THE SATULLO COMPANY
618 Cincinnati-Batavia Pike, Cincinnati, Ohio 45244
(513) 752-6683

15. **CLEVELAND, OHIO**
THE SATULLO COMPANY
16801 Euclid Avenue, Cleveland, Ohio 44112
(216) IV 6-2800

16. **DETROIT, MICHIGAN**
THE SATULLO COMPANY
4514 N. Woodward Ave., Royal Oak, Mich. 48072
(313) LI 9-3910

17. **CHICAGO, ILLINOIS**
MIDWEST ELECTRONIC SALES
5707 W. Division St., Chicago, Ill. 60651
(312) 626-0030 — TWX #312 265-1415

INDIANAPOLIS, INDIANA
MIDWEST ELECTRONIC SALES
5462 E. 40th St., Indianapolis, Ind. 46226
(317) LI 7-3259

MILWAUKEE, WISCONSIN
MIDWEST ELECTRONIC SALES
1317 Garfield Ave., Waukesha, Wisc. 53186
(414) 542-5129

18. **ST. LOUIS, MISSOURI**
NORMAN W. KATHRINUS & COMPANY
2427 Brentwood Blvd., St. Louis, Mo. 63144
(314) WO 2-5627

19. **MINNEAPOLIS, MINNESOTA**
E. C. ELECTRONIC SALES
10108 Abbot Ave., So., Minneapolis, Minn. 55431
(612) 869-1144 — TWX #612-292-4195

20. **KANSAS CITY, KANSAS**
NORMAN W. KATHRINUS & COMPANY
P.O. Box 23, Kansas City, Kan. 66103
(913) AD 6-4108

21. **DALLAS, TEXAS**
AIREP ENGINEERING COMPANY
P.O. Box 9555, Dallas, Texas 75214
(214) TA 4-3800

22. **HOUSTON, TEXAS**
AIREP ENGINEERING COMPANY
P.O. Box 36211, Houston, Texas 77036
(713) GY 4-2260

23. **ALBUQUERQUE, NEW MEXICO**
V. T. RUPP COMPANY
9611 Acoma Rd., S.E. Albuquerque, N.M. 87112
(505) 298-5589 — TWX #505-243-8409

24. **DENVER, COLORADO**
D. E. BOND ASSOCIATES
5670 East Evans, Denver, Colo. 80222
(303) 756-1234

25. **SAN DIEGO, CALIFORNIA**
V. T. RUPP COMPANY
3445 Fifth Avenue, San Diego, Cal. 92103
(714) CY 8-9835 — TWX #714-291-0736
In Arizona: Call Phoenix Enterprise 1234

26. **LOS ANGELES, CALIFORNIA**
V. T. RUPP COMPANY
307 Parkman Avenue, Los Angeles, Cal. 90026
(213) DU 7-8224 — TWX #213-380-8840

27. **SAN FRANCISCO, CALIFORNIA**
V. T. RUPP COMPANY
1182 Los Altos Avenue, Los Altos, Cal. 94022
(415) 948-1483 — TWX #415-949-7950

28. **SEATTLE, WASHINGTON**
HARRY LEVINSON COMPANY
1211 East Denny Way, Seattle, Wash. 98122
(206) EA 3-5100 — TWX #206-998-1047

IN CANADA

29. **TORONTO, CANADA**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
50 Wingold Avenue, Toronto 19, Canada
(416) RU 1-6174 — Telex 02-2319

30. **MONTREAL, QUEBEC**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
3333 Cavendish Blvd., Montreal, Quebec
(514) HU 9-8495 — Telex 01-2141

31. **OTTAWA, ONTARIO**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
342½ Elgin Street, Ottawa, Ontario
(613) CE 3-9471

32. **VANCOUVER, B.C.**
ATLAS INSTRUMENT CORPORATION
Division of Atlas Electronics Limited
909 Beach Avenue, Vancouver, B.C.
(604) MU 4-7927

OVERSEAS OFFICES

GREAT BRITAIN
AD. AURIEMA, LTD.
Impectron House, 125 Gunnersbury Lane
Acton, London W.3, England
Tel. ACorn 8762, Cable: AIREMA LONDON,
Telex: 25864

BELGIUM, LUXEMBOURG, and the NETHERLANDS
AD AURIEMA — EUROPE S.A.
172a Rue Brogniez, Brussels 7, Belgium
Tel: 22-28-35, Cable: ADAURI BRUSSELS,
Telex: 21646

FRANCE
AD. AURIEMA — FRANCE, S.A.R.L.
243 bis, Boulevard Pereire, Paris 17, France
Tel: ETOile 12-49 or 15-51, Cable: ADAURIE

AUSTRIA AND SWITZERLAND
AD. AURIEMA — EUROPE, S.A.
Fleiner Strasse 17
7100 Heilbronn (Neckar), West Germany
Tel: (07131) 8-23-24, Telex: 728639

ITALY
AD. AURIEMA, INC.
Via Ferdinando di Savoia 2
Milan, Italy
Tel: 653, 106 Cable: FERCO MILAN

GERMANY
DIPL.-ING. ERNST FEY
8 Munchen 2, Hormansstrasse 28 Germany
Tel: 60459, 69566,
Cable: FEYELECTRONIC-MUNCHEN

FOR OTHER FOREIGN COUNTRIES — CONTACT:

AD. AURIEMA, INC.
85 Broad Street, New York, N.Y. 10004
Tel: (212) BO 9-7750, Cable: AURIEMA, NEWYORK
Telex: RCA N.Y. 2791, TWX #710-581-3864

LITHO IN U.S.A.